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EXAMINER	
NOGUEROLA, ALEXANDER STEPHAN	
ART UNIT	**PAPER NUMBER**
1753	

DATE MAILED: 12/08/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/028,945	GASCOYNE ET AL.	
	Examiner	Art Unit	
	ALEX NOGUEROLA	1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11,15-19,22,23 and 26-28* is/are rejected.

7)☒ Claim(s) *12-14,20,21,24,25 and 29-31* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *20 December 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

Specification

1. The disclosure is objected to because of the following informality: the U.S. Patent Application Serial No. is missing from page 2, line 27 of the specification.

Appropriate correction is required.

Claim Objections

2. Claim 21 is objected to because of the following informalities: -- the -- should be inserted before "outlet". Appropriate correction is required.

Double Patenting

3. Claim 14 is objected to under 37 CFR 1.75 as being a substantial duplicate of claim 13. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

5. Claims 1-11, 15, 16, and 17 are rejected under 35 U.S.C. 102(e) as being anticipated by Shenderov (US 6,565,727 B1).

Addressing claim 1, Shenderov teaches a gate comprising one or more electrodes coupled between an inlet fluid pathway and an outlet fluid pathway (the abstract and Figures 1 and 8; note that an inlet fluid pathway is implied by the diluent line and the reagent supply line and an outlet fluid pathway is implied by the various outlets provided (col. 3, ln. 60 – col. 4, ln. 2)), the one or more electrodes configured to draw fluid from the inlet fluid pathway to the outlet fluid

pathway using forces arising from electrical signals applied to the one or more electrodes (col. 2, ln. 17 – col. 3, ln. 9).

Shenderov does not mention that the forces arising from the electrical signals applied to the one or more electrodes are dielectric forces or that the gate is a dielectric gate. However, that the forces created by the electrodes are dielectric forces and, thus, that the gate is a dielectric gate is anticipated because this is implied by Shenderov who teaches that electrical fields are created to pull polar liquid. Furthermore, as taught in detail by Washizu ("Electrostatic Actuation of Liquid Droplets for Microreactor applications," *IEEE Transactions on Industry Applications*, vol. 34, no. 4, July/August 1998, pp. 732-737) and Ohkawa (US 5,486,337), electrostatic transport of liquid droplets, which is the technique for which the electrodes used by Shenderov are configured (col. 2, ln. 18 – col. 3, ln. 9), involves creating dielectric forces that act upon the fluid (in Washizu see the first six paragraphs of *II. Principle*, which begins on page 732 and in Ohkawa see col. 3, ln. 40 – col. 6, ln. 35).

Addressing claims 2, 3, 10, and 11, the arrangements of electrodes for the embodiments shown in Figures 6-8 of Shenderov imply tubes or channels for the inlet and outlet fluid pathways.

Addressing claims 4, and 5, note hydrophobic regions 38 in Figure 4 of Shenderov, for example.

Addressing claims 6 and 15, as seen from col. 4, ll. 5-10 and Figure 1 of Shenderov a chamber is formed by the second (top) solid support.

Addressing claims 7 and 16, a drop meter is disclosed in col. 4, ll. 45-54 of Shenderov.

Addressing claims 8 and 17, as disclosed in col. 4, ll. 45-54 of Shenderov the drop meter comprises hydrophilic and hydrophobic regions.

Addressing claim 9, Shenderov teaches a gate comprising

an inlet fluid pathway (implied by the diluent line and the reagent supply line in Figure 8 and col. 3, ln. 60 – col. 4, ln. 2);

one or more electrodes in operative relation with the inlet fluid pathway (Figure 8);

a hydrophobic patch adjacent at least one of the electrodes (note hydrophobic coatings 28a and 28b in the cross-sectional view shown in Figure 1); and

an outlet fluid pathway in operative relation with at least one of the electrodes (implied by the various outlets provided (col. 3, ln. 60 – col. 4, ln. 2));

wherein the one or more electrodes are configured to draw fluid from the inlet fluid pathway to the outlet fluid pathway using forces arising from electrical signals applied to the one or more electrodes (col. 2, ln. 17 – col. 3, ln. 9).

Shenderov does not mention that the forces arising from the electrical signals applied to the one or more electrodes are dielectric forces or that the gate is a dielectric gate. However, that

the forces created by the electrodes are dielectric forces and, thus, that the gate is a dielectric gate is anticipated because this is implied by Shenderov who teaches that electrical fields are created to pull polar liquid. Furthermore, as taught in detail by Washizu ("Electrostatic Actuation of Liquid Droplets for Microreactor applications," *IEEE Transactions on Industry Applications*, vol. 34, no. 4, July/August 1998, pp. 732-737) and Ohkawa (US 5,486,337), electrostatic transport of liquid droplets, which is the technique for which the electrodes used by Shenderov are configured (col. 2, ln. 18 – col. 3, ln. 9), involves creating dielectric forces that act upon the fluid (in Washizu see the first six paragraphs of *II. Principle*, which begins on page 732 and in Ohkawa see col. 3, ln. 40 – col. 6, ln. 35).

Shenderov also does not mention that the hydrophobic patch is configured to inhibit fluid flow from the inlet fluid pathway to the outlet fluid pathway in the absence of the electrical signals; however, this is clearly implied as the liquid to be manipulated does not wet the hydrophobic patch and the liquid only moves when an electrical potential is appropriately applied to the electrodes (col. 2, ll. 26-47).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

9. Claims 18, 19, 22, 23, and 26-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shenderov (US 6,565,727 B1).

Addressing claim 18, Shenderov teaches a system for fluid flow control, comprising

a gate including an inlet and outlet fluid pathway (the abstract and Figures 1 and 8; note that an inlet fluid pathway is implied by the diluent line and the reagent supply line and an outlet fluid pathway is implied by the various outlets provided (col. 3, ln. 60 – col. 4, ln. 2));

a fluid reservoir coupled to the inlet fluid pathway of the gate (a drop meter is disclosed in col. 4, ll. 45-54. A reagent line and a diluent line are also disclosed in col. 3, ll. 60-67);

wherein the gate comprises the one or more electrodes configured to draw fluid from the fluid reservoir via the inlet fluid pathway to the outlet fluid pathway using forces arising from electrical signals applied to the one or more electrodes (col. 2, ln. 17 – col. 3, ln. 9).

Shenderov does not mention that the forces arising from the electrical signals applied to the one or more electrodes are dielectric forces or that the gate is a dielectric gate. However, that the forces created by the electrodes are dielectric forces and, thus, that the gate is a dielectric gate is anticipated because this is implied by Shenderov who teaches that electrical fields are created to pull polar liquid. Furthermore, as taught in detail by Washizu ("Electrostatic Actuation of Liquid Droplets for Microreactor applications," *IEEE Transactions on Industry Applications*, vol. 34, no. 4, July/August 1998, pp. 732-737) and Ohkawa (US 5,486,337), electrostatic transport of liquid droplets, which is the technique for which the electrodes used by Shenderov are configured (col. 2, ln. 18 – col. 3, ln. 9), involves creating dielectric forces that act upon the fluid (in Washizu see the first six paragraphs of *II. Principle*, which begins on page 732 and in Ohkawa see col. 3, ln. 40 – col. 6, ln. 35).

Shenderov also does not mention a fluidic device coupled to the outlet fluid pathway of the gate. However, Shenderov does disclose using the system for synthesis (col. 5, ll. 29-32). It would have been obvious to one with ordinary skill in the art at the time the invention was made

to couple a fluidic device, such as a microtiter plate, to the system because then the various compounds synthesized can be collected for use or testing.

Addressing claim 19, a hydrophobic patch adjacent at least one of the electrodes (note hydrophobic coatings 28a and 28b in the cross-sectional view shown in Figure 1). Shenderov also does not mention that the hydrophobic patch is configured to inhibit fluid flow from the inlet fluid pathway to the outlet fluid pathway in the absence of the electrical signals; however, this is clearly implied as the liquid to be manipulated does not wet the hydrophobic patch and the liquid only moves when an electrical potential is appropriately applied to the electrodes (col. 2, ll. 26-47).

Addressing claim 22, Figures 1-8 of Shenderov show single chip embodiments.

Addressing claim 23, using the system in conjunction with an electrophoresis device is disclosed in col. 5, ll. 34-37.

Addressing claim 26, using the system in conjunction with a programmable fluidic processor, such as an electrophoresis or other separation device, is disclosed in col. 5, ll. 34-40.

Addressing claim 27, Shenderov teaches a method for fluid flow control, comprising

flowing fluid from a fluid reservoir to an inlet fluid pathway (implied by col. 4, ll. 45-65, which teaches using a drop meter to introduce fluid into the fluid pathway); and

drawing the fluid from the inlet fluid pathway to by forces arising from a gate (col. 4, ll. 30-42 teaches using electrowetting to move the fluid).

Shenderov does not mention that the forces arising from the electrical signals applied to the one or more electrodes are dielectric forces or that the gate is a dielectric gate. However, that the forces created by the electrodes are dielectric forces and, thus, that the gate is a dielectric gate is anticipated because this is implied by Shenderov who teaches that electrical fields are created to pull polar liquid. Furthermore, as taught in detail by Washizu ("Electrostatic Actuation of Liquid Droplets for Microreactor applications," *IEEE Transactions on Industry Applications*, vol. 34, no. 4, July/August 1998, pp. 732-737) and Ohkawa (US 5,486,337), electrostatic transport of liquid droplets, which is the technique for which the electrodes used by Shenderov are configured (col. 2, ln. 18 – col. 3, ln. 9), involves creating dielectric forces that act upon the fluid (in Washizu see the first six paragraphs of *II. Principle*, which begins on page 732 and in Ohkawa see col. 3, ln. 40 – col. 6, ln. 35).

Shenderov also does not mention drawing fluid to an outlet fluid pathway and then flowing the fluid from the outlet fluid pathway to a fluidic device. However, Shenderov does disclose several types of devices to which fluid can be flowed to, such as electrophoresis or other separation devices. It would have been obvious to one with ordinary skill in the art at the time the invention was made flow the fluid to a fluidic device so further analysis or reactions can be performed. For example, if the fluid is flowed to an electrophoresis device analytes in the fluid can be finely separated into various fractions and then detected or collected.

Addressing claim 28, as seen in Figure 1 the fluid flow pathways comprise a top and a bottom hydrophobic coating. Fluid only flows when the electrodes are appropriately activated.

Allowable Subject Matter

10. Claims 12, 13, 20, 21, 24, 25, and 29-31 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

a) Claims 12, 13, 30, and 31 each require a virtual channel to be defined by hydrophobic or hydrophilic surface coatings. While Shenderov teaches hydrophobic coatings, he does not mention hydrophilic coatings. The hydrophobic coatings over the entire possible flow area and do not provide preferential flow directions. Fluid flows by activating selected electrodes in the electrode arrays, which are covered by the hydrophobic coatings (Figures 1 and 5);

b) Claim 20 requires the fluid reservoir to be pressurized. In Shenderov the fluid reservoir (drop meter) introduces fluid into the inlet fluid pathway through elecrowetting

(col. 4, ll. 61);

c) Claim 21: neither Shenderov, Washizu, nor Ohkawa disclose configuring an impedance sensor to count the droplets transferred from the inlet fluid pathway to the outlet fluid pathway;

d) Claim 24 requires the fluidic device to comprise a polymerase chain reaction device, which is not disclosed or suggested by the prior art of record;

e) Claim 25 requires the fluidic device to comprise a dielectrophoresis field flow fractionation device, which is not disclosed or suggested by the prior art of record; and

f) Claim 29: neither Shenderov, Washizu, nor Ohkawa disclose using an impedance sensor to count the droplets transferred from the inlet fluid pathway to the outlet fluid pathway.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ALEX NOGUEROLA whose telephone number is (703) 305-5686. The examiner can normally be reached on M-F 8:30 - 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, NAM NGUYEN can be reached on (703) 308-3322. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9310.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Alex Noguerola 11/28/03
Alex Noguerola
Primary Examiner
TC1753